Public Works Department Metrics for Keflavik, Iceland

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Report

Presented to the Faculty of the Graduate School

of The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Master of Science in Engineering

The University of Texas at Austin

August 1997
Public Works Department Metrics for Keflavik, Iceland

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1. Introduction

The Total Quality Philosophy had its start in the Navy in 1985. Ten years later, this philosophy has stalled in the middle management area of the workplace. These managers know how to repair broken machinery or design facilities, but lack the management skills necessary to lead and encourage the workforce they manage into the next century.

A few years ago, Commander-in-Chief, US Atlantic Fleet, (CINCLANTFLT) created a metrics program (DON 1996) to better understand the operations of the various bases. (The Navy has had a similar program for operational ships for decades, but shore establishments were excluded due to the various complexities and diverse locations.) As the Navy developed this program, requests for data went out to the individual bases for input. The underlying problem in the whole process was that the “experts” in the metrics operations did not fully understand the type of business the various commands performed throughout the world. They even asked the base operators for “data that would make for a good metric.” Since the process owners had no understanding of what made for a good metric, they were unable to fulfill the requirements to produce satisfactory results.

Public Works Iceland has collected data over the years concerning several issues, but middle management simply collected data and sent this information up the chain of command to the Public Works Officer. The workforce never saw the data, knew what the data said, or saw the outcome of the report. As an example, the workforce is required to submit their annual leave plan in an effort to ensure a sufficient workforce at any time. This information is used to schedule the work hours for the year. Data are collected to compare
the actual leave with the scheduled leave and compare this to the production cycle. This report is sent up the chain of command, but the workforce does not see this report or understand the relationship between scheduled and actual leave. Keeping the workers informed about overall productivity and the meaning of the measured data is the responsibility of the middle managers. Indeed, making sure that the right data are collected is also management’s responsibility.

1.1 Scope
A successful manager’s job is not as a drill sergeant barking orders to his platoon, but as a coach coordinating his players’ actions to become more successful. A manager must provide for the needs of his people: direction, knowledge, resources, and support (Byham 1988).

- Direction is provided by establishing key result areas, goals and measurements.
- Knowledge involves needed job skills, technical training, data, information, expertise.
- Resources required for a successful team performance include tools, materials, facilities, time and money.
- Support is the foundation and catalyst for the team -- approval, encouragement, feedback, reinforcement, recognition

Much has been written concerning these four areas. The scope of this paper is to focus on the “direction” area by analyzing the metrics at the Public Works Department (PWD), Keflavik Iceland. Metrics provide the direction needed for growth by identifying key result areas, measurements, and goals. Key result areas address the direction an organization wishes to go. Measurement is a way of knowing if the organization is moving in the right direction in terms of the key result areas. Finally, the goals provide for a level of achievement or set a standard to reach for.
Before Key Result Areas can be established, an understanding of the organization’s processes is vital. A useful tool in this analysis is the SIPOC diagram. SIPOC stands for Supplier - Input - Process - Output - Customer. Suppliers are the individuals or other organizations that provide an input or supplies for the processes. The customers are the individuals or organizations that use the output generated by the processes. Figure 1 shows an example of a simple SIPOC diagram for one area of PWD Keflavik. SIPOC’s for the entire PWD Keflavik are given in Appendix A and discussed further in Chapter 3.

![SIPOC Diagram](image)

**Figure 1 - SIPOC Diagram**

### 1.2 Objectives

The objectives of this report are as follows:

1. Develop SIPOC diagrams for PWD Keflavik.
2. Capture the existing measures and reporting techniques at PWD Keflavik.
3. Analyze the measures for viability.
4. Develop a list of viable metrics (Remove the measures that are unnecessary and add any that are necessary for PWD Keflavik.)
5. Develop a training plan for the PWD Keflavik workers in the data gathering and reporting of the metrics.
2. Background

2.1 Mission of Public Works

Throughout the Navy, Public Works Departments are tasked with maintaining the shore facilities that support the world-wide fleet. Without such support, the ships and planes that project America’s presence to the far reaches of the world would be impossible. PWDs vary in size from small units where the maintenance force is composed of civilian contracted labor to large departments made up of government civilian and military labor. Regardless of size, the basic mission of PWDs is to provide public works services to the bases and its operating commands. These services include facility maintenance, utilities, transportation service, engineering support, and environmental services.

2.1.1 Size

Public Works Department, Keflavik is composed of military forces along with both US and Icelandic civilian personnel. The department is composed of six military officers, 58 enlisted, five US civilians and 260 Icelandic civilians. Typical duty length for the military is 1.5 years (unaccompanied) to 2.5 years (accompanied). Due to the frequency of the rotating positions, the Icelanders provide a continuation to the overall direction of Public Works.
Public Works' basic functions are shown in figure 2 and can be broken into two categories: support and operational. The support comes in the form of engineering, planning, and administrative assistance. Contracting and environmental divisions provide both support and operational duties. The operational backbone of the PWD is the maintenance, utility, and transportation divisions. These divisions are composed of Icelandic civilians and augmented with the enlisted military personnel. They perform duties ranging from minor repairs and preventive maintenance, to major renovations of facilities. In addition, they operate and maintain the base power plant, water plant and all government vehicles on base.

![Public Works Organization Diagram]

*Figure 2 - Public Works Organization*

### 2.1.2 Location

Iceland is located just south of the Arctic Circle in the Atlantic Ocean (figure 3). Naval Air Station Keflavik lies on the southwest corner of Iceland which makes for some unique problems. A harsh environment coupled with a unique terrain present a tremendous
challenge to maintain a fully operational base. Low temperatures, high winds, combined with rain and snow, provide a new definition of a "challenging environment."

2.2 Why Measure?

"Why measure?" is perhaps the most common question asked by management when addressing the subject of metrics. The answer resides in the fact that items that are measured are items that see improvement over time. The realm of measuring comprises many facets and is possibly overwhelming for some. An understanding into the basics of measurements is the first stage of developing a successful program.

2.2.1 Types of measurements

Measurements can be broken into three classes: anecdotal, subjective, and objective. Anecdotal information is that which comes from one source or one person's opinion. Depending on the individual experience, the rating might be favorable or unfavorable. Subjective measurements also contain personal feelings but are from a larger source of information. These might be in the form of opinion polls, surveys, and questionnaires.
Objective measurements are the most accurate form of information since they are not affected by personal feelings or prejudices. These measurements are based on facts and, if done correctly, are unbiased. The difficulty most managers have in using measurements is their desire to use objective data, but subsequently reacting to anecdotal statements from their boss or customers.

2.2.2 Types of performance measures

Performance measures rely on the objective class of measurements. Since objective data are not based on personal feelings or prejudices, a realistic picture of the operation is possible. Research into measurements has developed some lengthy lists, but most performance measures can be broken into four types (Ammons 1995):

- Workload measures
- Efficiency measures
- Effectiveness measures
- Productivity measures

Workload measures indicate the amount of work performed or the amount of services received by the customer. Examples of workload measurements include number of service calls received, amount of estimates completed, amount of design work completed. While this type of measurement is useful to determine the amount of work done, it does not show efficiency or effectiveness.

Efficiency measures illustrate the relationship between the work performed and the resources required to perform it. Most efficiency measurements are presented as unit costs. Unit costs are calculated by dividing total costs of a service or function by the number of units provided. For example, if a 200 meter underground electrical line is installed for a cost
of $50,000. The unit cost is $250/meter. Similar costs can be calculated for engineering
design, estimates, transportation repairs, and various other functions within a PWD. When
these costs are compared to past performance or unit costs by contracting, wise decisions can
be made when allocating resources.

Effectiveness measures reflect the degree to which performance objectives are being
achieved or reflect the quality of the organization’s performance. The number of work hours
spent on construction re-work or error free engineering designs are examples of
effectiveness measures.

Productivity measures combine the dimensions of efficiency and effectiveness into a
single indicator. For example, “time spent on a maintenance service call” would measure
efficiency and “percentage service calls completed properly” (i.e., not called back for the
same problem) would reflect effectiveness. “Labor-hours per effective service call
completion” would indicate productivity.

2.2.3 Attributes of good metrics

Developing a set of metrics is a fairly simple task. Developing a set of useful metrics
is the difficult part. Too often managers try to improve their organization by creating new
measures to report. The weakness in this approach comes from not fully understanding the
qualities that make up a quality metric. The following list attempts to provide a framework
or guideline for managers when deciding what and how to measure their processes (Tucker
1997). Successful metrics must:

- Be accepted as meaningful to the customer
- Tell how well an organization’s processes and tasks fulfill its goals and objectives
- Be simple, understandable, logical and repeatable
• Be timely
• Show a trend
• Be clearly defined
• Be economical to collect the data
• Drive the appropriate action

2.2.4 Overcoming resistance to performance measurement

Even if all these criteria are met, people will still resist performance measurement. Performance measurement is seen as a threat by various groups in an organization. Middle management might feel threatened as the upper levels of management get a closer look into their "sacred" operations. Employees feel that measuring will lead to tougher work standards and less favorable working conditions and perhaps even layoffs. Even with the best programs and most accurate set of measurements, overcoming resistance by employees is still a factor to consider. David Ammons (1995) mentions several reasons people resist measurement:

• “You can’t measure what I do”
• “You’re measuring the wrong thing”
• “It costs too much and we don’t have the resources”
• “I don’t want to know how I am doing”

2.2.4.1 Impossible to Measure - “You can’t measure what I do”

Divisions where work is of a non-routine nature and a data collection system does not exist will complain the loudest at performance measurement. They have survived this long without measuring, why start now? If the division could be measured, a system would already be in place. A starting place for determining what areas to measure lies in the answer to the question: “If your office closed shop for a few weeks, who would suffer the greatest impact, and what aspect of your work would they miss the most?” With this answer, acceptable performance measures can be easily developed.
2.2.4.2 Incorrect Measures - "You're measuring the wrong thing"

This argument usually is heard when the service providers are not consulted prior to developing performance measures. Insignificant indicators are being measured and more important dimensions are ignored. Communication between all levels in the organization is critical to ensure measurements are valid and that everyone understands the reasons behind the measurements.

2.2.4.3 Collection Economy - "It costs too much and we don't have the resources"

Economy of the data collection and the time required to collect and report are fundamental to a successful metric. Several companies have spent more effort and money collecting data than the money they have saved by using the results (Ammons 1995).

2.2.4.4 Ostrich Management - "I don't want to know how I am doing"

Some managers simply do not care or do not want to know how their operations are performing. They have the "See no evil, Hear no evil, Speak no evil" mindset and hope that by burying their head in the ground, all bad problems will disappear. These managers must be able to see the results of a measurement system before solid changes can take place.

2.3 Current Training

Currently PWD Keflavik is not training personnel on subject matter related to measurements of quality initiatives. Several years ago, PWD Keflavik began a push to educate personnel on the aspects of Total Quality Management. People attended training, but there was no plan for practicing the concepts learned in the classes when they returned to work. Recently PWD Keflavik has begun to develop a long range plan for the department and is utilizing teams to research the options available. Through the use of teams, the PWD
is seeing improvements, but this improvement is restricted due to insufficient training for the teams. More successful teams are ones that have a leader with a strong background and interest in TQ tools and techniques.

Peter Scholtes describes the four phases of team growth (forming, storming, norming, and performing) in *The Team Handbook* (Scholtes 1988). Unprepared teams frequently never make it past the storming stage in team growth. When the storm arrives, they abandon the ship, call the event a failure, and return to their old way of doing things. Successful teams move beyond the stage and eventually reach the performing stage with outstanding results. Metrics provide a sound basis for a successful team environment.
3. Methodology

In order to evaluate PWD Keflavík and develop meaningful metrics, the following methodology was used in this study.

3.1 Capture Existing Metrics

A two week site visit was conducted in May 1997 to examine the state of measurements at PWD Keflavík. One-on-one interviews were conducted with all nine division managers to understand the complexity of their organization. The interviews followed a basic pattern focused on using the SIPOC diagram as the foundation. This first step in the interview allowed each manager to clearly focus on what their division actually did before trying to address any measurement techniques. Understanding this process is the first step to improvement, with the second being process measurement. Appendix A contains SIPOC Diagrams for all nine divisions.

After the SIPOC was complete, a review of current measurements of conducted. Each interviewee was asked: Are they currently conducting any measurements? Have they seen a trend over the past year? Has there been an increase or decrease in the process time? Many of these questions were unanswerable since measurements did not exist. The few managers who still collected data either were not reporting to anyone or did not fully understand how to analyze the data generated to make future management decisions. These existing measurements were discussed to improve the method of presentation and analysis along with providing for a structured approach to measurement.
3.2 Review Required Metrics

While no formal metrics methodology exist for PWD Keflavik internally, several divisions do measure portions of their operations. Without a formal structure or requirement, the validity is questionable at best. In May of 1996, CINCLANTFLT developed a metrics program for shore installations called CINCLANTFLT Shore Installation Required Operational Capabilities Metrics. The external requirements have been in place for over a year now, but their use is ineffective for the PWD. These metrics are used at the CINCLANTFLT level to compare bases to each other, but the local bases are unable to use the information effectively since the delay in providing feedback from CINCLANTFLT to the local bases is excessive. Along with delayed feedback is the constantly changing political nature of the program without providing information to the providers of information. The latest change is the name of the program from “Metrics” to “Measures of Merit.”

3.3 Develop Common Metrics

Since the metrics program for CINCLANTFLT fails to provide adequate feedback on operations for PWD Keflavik, improvement of existing measurements and development of new measurements is essential. Actual data from previous years was gathered to develop several new metrics. These data were discussed with the division directors to clarify the accuracy and create an understanding into the process. In an effort to normalize all the metrics between divisions, Tables of Standards (appendix B) were developed for each metric to provide a framework common to all measurements within Public Works.
4. Data Presentation and Analysis

SIPOC’s developed for all nine divisions show the input and output to each process within the division. From process review of the SIPOC’s, metrics were developed to measure the capability of the process. Existing metrics were refined and new metrics were created to develop an accurate presentation of the operations at PWD Keflavik.

4.1 SIPOC

Figure 4 shows a SIPOC diagram for the maintenance division of PWD Keflavik. As an example, one of Maintenance’s processes is emergency and service calls. Base personnel submit trouble calls to PWD via the trouble desk. The input received by Maintenance is in the form of a printed work order (or phone call if on an emergency nature.) The other input Maintenance receives is material that comes from the Material Branch of PWD Keflavik. The output comes in the form of a repair to the broken item which satisfies the customer (Base personnel.)
<table>
<thead>
<tr>
<th>Supplier</th>
<th>Input</th>
<th>Process</th>
<th>Output</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Base residents</td>
<td>Phone call, printed record</td>
<td>Emergency Calls</td>
<td>Repair</td>
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<td></td>
<td>Trouble Desk</td>
<td></td>
<td>Service Calls</td>
<td></td>
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<td></td>
<td>Material Branch</td>
<td>Construction material</td>
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<tr>
<td></td>
<td>FMED (P&amp;E)</td>
<td>Job Order</td>
<td>Minor Projects (&lt;48 hours)</td>
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<td></td>
<td></td>
<td>Package</td>
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<tr>
<td></td>
<td>Engineering</td>
<td>Designs</td>
<td>Specific Projects (&gt;48 hours)</td>
<td>Construction or repair</td>
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<td></td>
<td>Material Branch</td>
<td>Construction materials</td>
<td>Standing Job Orders</td>
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<td>FSC</td>
<td>Assist contracts</td>
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<td></td>
<td>FMED</td>
<td>PM Job orders, recurring work</td>
<td>PMI / Recurring work</td>
<td>Maintenance &amp; Repair</td>
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<td></td>
<td>Material Branch</td>
<td>Construction materials</td>
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Figure 4 - Example SIPOC for the Maintenance Division of PWD Keeflavik

Table 1 provides reference for all the SIPOC diagrams located in Appendix A. The SIPOC’s are broken down by PWD Keeflavik Divisions. SIPOC Diagrams have multiple uses within an organization. Perhaps the most used application is improvement of processes. Many organizations focus on process improvement, but do not have a clear understanding of their processes. SIPOC defines these processes and forces the owners to set boundaries of these processes. These boundaries are the ranges of customers and suppliers along with inputs received and output generated.
The second use is to capture metrics. Measuring a process that is not related to an organization’s processes is a waste of valuable resources. Metrics must somehow be a reflection of the SIPOC. For example, the Maintenance Division measures “leave predictability.” This is not a processes itself, but it an indicator of all their processes since available labor is essential to their processes.

Communications breakdown can be avoided with quality SIPOC diagrams. Through the use of these accurate diagrams, various members of the organization can see where they fit into the roles as supplier and customer.

Lastly, the SIPOC’s included can be further broken down to provide the level of detail necessary for the organization. They should also be updated regularly as processes and situations change. For example, pest control responsibility transferred from the Maintenance division to the Environmental division. Detail SIPOC diagrams should reflect these changes to avoid portraying an inaccurate picture of the organization.

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<td>Figure A.7</td>
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<tr>
<td>608 - Contracting</td>
<td>Figure A.8</td>
</tr>
<tr>
<td>60E - Environmental</td>
<td>Figure A.9</td>
</tr>
</tbody>
</table>
4.2 Metrics

Appendix B shows a complete list of metrics with their breakdown of standards. These standards provide for a normalization for all metrics. This approach attempts to eliminate irrelevant, non-cost effective measures and formally recognize those that are relevant. (Oswald 1992). Individual metrics are analyzed to include the following:

- Definition of what is being measured
- Justification for the measurement, including key result areas supported
- Description of all terms involved in the measure and units
- Sources of data
- Data presentation method, including chart type, software used
- Update cycle
- Responsibility for data collection, plotting analysis
- Distribution of updated charts
- Highest level of review
- Who is responsible for taking necessary control action
- Comments & summary

4.3 Refinement of Metrics

Keeping in mind the requirements for successful metrics, Table 2 provides reference for the PWD Keflavik metrics. Due to the number of metrics, Appendix B is divided into nine sections to correspond with the PWD divisions. Most metrics listed in Table 2 are self-explanatory or are a refinement of the existing measurement at PWD Keflavik. However, some require additional explanation since they are new to the system.
### Table 2 - List of valid metrics for PWD Keflavik

<table>
<thead>
<tr>
<th>Division Code</th>
<th>Metric</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>601 - Fiscal Personnel</td>
<td>Work Year Utilization</td>
<td>Figure B1.1</td>
</tr>
<tr>
<td></td>
<td>End Strength Utilization</td>
<td>Figure B1.2</td>
</tr>
<tr>
<td></td>
<td>PWD Toll Costs</td>
<td>Figure B1.3</td>
</tr>
<tr>
<td></td>
<td>PWD Overtime Utilization</td>
<td>Figure B1.4</td>
</tr>
<tr>
<td></td>
<td>OPTAR P1</td>
<td>Figure B1.5</td>
</tr>
<tr>
<td>602 - Facilities Management Engineering</td>
<td>Long Range Plan - Investment Categories</td>
<td>Figure B2.1</td>
</tr>
<tr>
<td></td>
<td>Customer Breakdown</td>
<td>Figure B2.2</td>
</tr>
<tr>
<td></td>
<td>Variance Report (Delay causes) *</td>
<td>Figure B2.3</td>
</tr>
<tr>
<td>603 - Engineering</td>
<td>Design Effort Efficiency *</td>
<td>Figure B3.1</td>
</tr>
<tr>
<td>604 - Planning</td>
<td>Special Projects *</td>
<td>Figure B4.1</td>
</tr>
<tr>
<td></td>
<td>Space Utilization</td>
<td>Table B4.2</td>
</tr>
<tr>
<td>605 - Maintenance</td>
<td>Shop Loading Predictability</td>
<td>Figure B5.1</td>
</tr>
<tr>
<td></td>
<td>Priority Job Impact on Shop Load Plan</td>
<td>Figure B5.2</td>
</tr>
<tr>
<td></td>
<td>Effect of leave planning on Shop Load Plan</td>
<td>Figure B5.3</td>
</tr>
<tr>
<td></td>
<td>In-House Shop Forces Efficiency</td>
<td>Figure B5.4</td>
</tr>
<tr>
<td></td>
<td>Foreman Delay Study</td>
<td>Figure B5.5</td>
</tr>
<tr>
<td></td>
<td>Service calls completion time *</td>
<td>Figure B5.6</td>
</tr>
<tr>
<td></td>
<td>Service calls backlog *</td>
<td>Figure B5.7</td>
</tr>
<tr>
<td></td>
<td>Number of jobs using MS Project *</td>
<td>Figure B5.8</td>
</tr>
<tr>
<td>606 - Utilities</td>
<td>Electricity Use</td>
<td>Figure B6.1</td>
</tr>
<tr>
<td></td>
<td>Water Use</td>
<td>Figure B6.2</td>
</tr>
<tr>
<td></td>
<td>Geothermal Use</td>
<td>Figure B6.3</td>
</tr>
<tr>
<td>607 - Transportation</td>
<td>Total Down Time *</td>
<td>Figure B7.1</td>
</tr>
<tr>
<td></td>
<td>Vehicle Turn-around time *</td>
<td>Figure B7.2</td>
</tr>
<tr>
<td>608 - Contracting</td>
<td>Invoice turn-around time *</td>
<td>Figure B8.1</td>
</tr>
<tr>
<td></td>
<td>Contractor Performance Evaluation (annual)</td>
<td>Table B8.2</td>
</tr>
<tr>
<td></td>
<td>Customer Satisfaction</td>
<td>Table B8.3</td>
</tr>
<tr>
<td></td>
<td>Procurement Action Lead Time</td>
<td>Table B8.4</td>
</tr>
<tr>
<td>60E - Environmental</td>
<td>Hazardous Waste response time for pick-up *</td>
<td>Figure B9.1</td>
</tr>
<tr>
<td></td>
<td>Spill response time *</td>
<td>Figure B9.2</td>
</tr>
<tr>
<td></td>
<td>Construction Review *</td>
<td>Figure B9.3</td>
</tr>
<tr>
<td></td>
<td>(number of review/time for reviews)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water Quality Sample Collection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(time sample received, collected / consistency in sample sites / customer sat)</td>
<td>Table B9.4</td>
</tr>
</tbody>
</table>

* Hypothetical Data - charts shown do not reflect real conditions
**Work Delay Study** - This measurement should be conducted monthly by surveying the foremen one day/week or for one week/month. After the data are collected and compiled into a summary report format, improvements can begin in areas that cause a considerable amount of delay for the shops.

**Shop Load Variance/Delay** - There are inevitable delays each month from the shop load plan. Understanding the reasons for delays is the beginning of improvement. Before the monthly Variance meeting, calculation of the percentages of delay by category (W - weather, L - labor availability (lack of), M - material, U - unforeseen conditions, S - customer change in scope, C - customer caused delay, O - other). Comparison of these percentages over the year will clearly reveal the areas where improvements can begin.

**Engineering Efficiency** - The engineering division accurately tracks hours spent on every aspect of engineering. Using this information to develop the unit costs for design work will allow them to benchmark their costs of work with private contractors.

**Planning Efficiency** - Simply measuring the number of estimates generated will not indicate the efficiency of the planning division. The unit measure (hours/estimate) will provide a better picture of the efficiency of the division personnel. Tracking of personnel hours (similar to the FMED and Engineering Division) will enable further development of effective measures for the planning division.

**Vehicle Down-time** - PC Transport software does not accurately calculate the downtime of vehicles. It is recommended to develop a meaningful measurement to
accurately show vehicle downtime for various vehicle categories. Another recommendation is to develop a similar measurement for vehicle turn-around time.

**Customer Satisfaction for contracted work** – Management should develop a short series of questions to ask random customers about the service they receive from contracted work. The information can then be compiled into a meaningful presentation. This qualitative measurement will provide additional insight into the regular inspections.

**Procurement Action Lead Time** - The Contracting Officer and Contract Specialist should develop a schedule for procurement actions based on best available data. These actual dates for important milestones should then be tracked and compared with original schedule dates. An analysis is necessary to determine if actions are meeting anticipated target dates or if many actions are slipping and delaying the overall project. (Consult with Maintenance Division for help in using MS Project software to develop and use schedules for procurement items.)

### 4.4 Specific Findings

Two specific findings are discussed below concerning scheduling of shop forces. These findings are based on the data from the Actual Shop Load Plan from October 1995 to April 1997. These results are valid due to the fact they are based on objective data and cover a sufficient time period. Improving the conclusions is possible by monitoring and collecting additional data over the future time period.

Figure 5 shown below demonstrates the correlation of percentage available work-hours scheduled with percentage of shop load plan hours worked. A linear regression
indicates that the higher the percentage the plan is loaded, the less chance of meeting the plan is guaranteed. Using the actual past data, management must determine what “percent accomplished” they are satisfied with and schedule accordingly. If management wants a target of 95% accomplished, data indicates loading the plan to 80% of the available hours. If they desire to have the plan accomplished to 80%, then load the plan at 92% of available hours. Meeting the scheduled plan is desired since delays or jobs not worked must fall back to the next month and will have a ripple effect on numerous other jobs.

![Shop Loading Predictability](image)

*Figure 5 - Example of Shop Loading Predictability*

The other important factor of shop load scheduling is the amount of hours spent on Priority Jobs. This chart is shown below in Figure 6. Data from the previous two years indicates that an average of 250 work hours per month are spent on priority jobs that were not originally on the Shop Load Plan. These numbers should be taken into consideration.
when scheduling the monthly work. Ignoring the hours will not make the conditions disappear, but will only cause the jobs originally scheduled to be delayed. This ripple effect not only makes the scheduler's job more difficult, but causes customer inconvenience and irritation when their jobs are delayed.

![Priority Job Impact on Shop Load Plan](image)

*Figure 6 - Example of Priority Job Impact*

The PWD Divisions should review their individual sections and improve upon the baseline presented here. Updating the SIPOC diagrams as processes change is vital in showing an accurate picture of the work within the divisions. The metrics presented are a starting point in understanding how to manage the future by using data from the past. The charts must be updated and reviewed continually if they are to be of any use. Training of personnel involved in the updating process is critical for continued improvement within the department.
5. Training

For the preceding metrics to become ingrained into the normal operations at PWD Keilavik, individuals must be trained in the use and knowledge of metrics. With the closing of the Quality Resource Center in Keilavik, PWD must develop its own in-house training course for the employees involved in the measuring process. Table three lists the important features to be included in a training plan.

<table>
<thead>
<tr>
<th>Topics</th>
<th>Attendees</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brief review of TQM/TQL principles</td>
<td>Assistant Division Directors</td>
<td>2 days</td>
</tr>
<tr>
<td>Introduction to measuring techniques</td>
<td>Any employee who will create and update charts</td>
<td></td>
</tr>
<tr>
<td>Measuring strategies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality Tools (decision making) -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brainstorming, Tree diagram,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIPOC, Cause &amp; Effect diagram</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process Measuring Tools - Check sheet,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run chart, Control chart, Histogram,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scatter plot</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Brief review of TQM/TQL principles          | Division Directors         | 1 day    |
| Overview of Process measuring tools        |                            |          |
| Data analysis                              |                            |          |
| Planning through use of measurements       |                            |          |

**Suggested Sources for Information:**

- The Team Handbook (Scholtes 1988)
- The Memory Jogger Plus+ (Brassard 1989)
- The Memory Jogger II (Brassard 1994)
- Process Improvement Tools & Techniques (DON, no date)
One aspect of the training involves constructing control charts. Control charts exist in many forms for different types of data. The “Individuals with a Moving Range” chart is the best format for measuring the type of work within Public Works Department since the data accumulates rather slowly and it is unable to be sub-grouped. Another advantage is that the individual charts are not sensitive to small shifts in the process average. The Memory Jogger II, published by GOAL/QPC provides excellent information on constructing control charts. Figure 6 shows an example of a control chart.

Various other chart types are shown in Appendix B. A scatter plot with a regression line is shown in Figure 5. A Histogram indicating a breakdown by various customers is shown in Figure B2.2. Figure B4.1 provides an example of a run chart. After more values are collected, control limits can be established and it can be converted into a control chart.
6. Conclusions & Recommendations

6.1 Conclusions

SIPOC diagrams for all nine divisions at PWD Keflavik were developed to provide an overall picture of the processes within the department. From these initial diagrams, metrics that met the criteria for successful metrics were created to measure the processes.

Through the use of the metrics and actual data gathered, interesting results were found concerning the scheduling of the maintenance shop forces. These results show how measurement tools must be used as a management tool for planning the future. Using the results as simply a history record is the same as riding a horse backwards: you have no idea where you are going, but you know exactly where you have been. Many hours were spent developing these metrics and it is management’s task to use the information within their organization to continually improve their performance.

6.2 Recommendations

For any measurement program to have a chance of survival, it must be flexible and useable. Charts that hang on a wall and yellowed from age indicate management does not care and just simply went through the motions. With management firmly behind the program, the chances of success increase exponentially. Six recommendations for a successful program are:

Anticipate resistance – as with any change, there will always be individuals who fight it. Most of the resistance comes from ignorance of the new system and familiarity with the old.
Involvem employees in developing the correct measures – one step in reducing resistance is to actively involve employees in developing the correct measures. Train them in data collection and analysis. (i.e., let them create the charts.) It is their process and they should have control of it.

Do both quantitative and qualitative analysis – Focusing only on quantitative measures can lead to erroneous mistakes, especially if the numbers are gamed or manipulated to make the organization look better. Along with focusing on numbers, add qualitative measures involving customer satisfaction. Talking with customers and employees adds additional insight to the organization’s processes.

Subject measures to annual review and modification – Every year review the existing measures to determine the adequacy of the reporting technique. The decision should be made to keep as is, modify, or delete the measurement.

Do not use too many or too few measures – During the review process, care should be taken to ensure the right measures are used. Too few will not allow insight into the processes while too many will detract from the important issues.

Focus on maximizing the use of performance data – Good measurements do not guarantee successful management. Only when the managers integrate the results into their management style will the chance of improvement result. Managers must understand the importance of using measurements in forward-looking management when planning work, budgets, and reward systems.
Reviewing these six points will help a PWD’s metrics program survive and grow through the years. Without these, the program will die after only one or two years. Consistent application of objective data to major decisions through the use of metrics will ensure PWD will continue to grow and improve its service to its internal and external customers.
Appendix A - SIPOC Diagrams
Figure A.1 - SIPOC Diagram for Fiscal / Personnel Division
### 602 - Facilities Management Engineering

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Input</th>
<th>Process</th>
<th>Output</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Customers</td>
<td>Phone call</td>
<td>Work reception &amp; control</td>
<td>Job Order</td>
<td>In house force (Military &amp; Civilian)</td>
</tr>
<tr>
<td></td>
<td>Work request</td>
<td>&quot;PWMA&quot; maintenance (Control)</td>
<td></td>
<td>Contractor (ROI CC &amp; FSC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Filing &amp; data gathering</td>
<td></td>
<td>Self-help</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Customer Liaison</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Planning &amp; Estimating</td>
<td>Bill of Material</td>
<td>Material Branch/Supply</td>
</tr>
<tr>
<td>P&amp;E Inspectors (AIS)</td>
<td>Inspection Report</td>
<td>Work Packaging (Generated Work)</td>
<td>AIS Report</td>
<td>Maintenance Action Plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inspections</td>
<td></td>
<td>Budget</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Control Inspections (AIS)</td>
<td></td>
<td>Execution Report</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Special Inspections (boiler, roof, BOD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comptroller</td>
<td>&quot;$$$&quot; Authorization</td>
<td>Funds Management (MRP Budget)</td>
<td>Spending execution plan</td>
<td>Report back to comptroller through 601</td>
</tr>
<tr>
<td>Base Customer</td>
<td>Work Requests</td>
<td>Work Planning</td>
<td>Long range plan</td>
<td>Shops (Specific, minor, PMI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multi-year maintenance</td>
<td>Shop load plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contract execution plan (FSC)</td>
<td>Engineering, FSC, ROI CC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Special project preparation</td>
<td>Engineering, Planning</td>
</tr>
<tr>
<td>Base Customers</td>
<td>Request for assistance</td>
<td>Self-help</td>
<td>Authorization</td>
<td>Self-help shop</td>
</tr>
<tr>
<td>Shops, comptroller, P&amp;E</td>
<td>$$, hours</td>
<td>Analysis &amp; productivity</td>
<td>Variance report, EPS report</td>
<td>PWO</td>
</tr>
</tbody>
</table>

*Figure A.2 - SIPOC Diagram for Facilities Management Engineering Division*
**Figure A.3 - SIPOC Diagram for Engineering Division**

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Input</th>
<th>Process</th>
<th>Output</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Customers</td>
<td>Funds, scope, requirements</td>
<td>Designing</td>
<td>Completed design for ROICC or Shops</td>
<td>Base Customers</td>
</tr>
<tr>
<td>Regulatory Agencies</td>
<td>Review of designs &amp; specifications</td>
<td>Contract Specification Writing</td>
<td>FSC Contracts</td>
<td>FMED</td>
</tr>
<tr>
<td>Safety</td>
<td>Technical consulting</td>
<td>Reviews Papers Recommendations Memos &amp; briefs Word of advice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td>General support</td>
<td>Copies of maps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire</td>
<td>Estimating</td>
<td>Budget estimates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Hygienist etc.</td>
<td>PWO/APWO/601</td>
<td>$$$ Equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supplier</td>
<td>Input</td>
<td>Process</td>
<td>Output</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>-------</td>
<td>---------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>AIS/BASEREP/Customer</td>
<td>Needs, mission changes</td>
<td>Project Documentation</td>
<td>Major Claimant</td>
<td></td>
</tr>
<tr>
<td>NATO, maintenance &amp;</td>
<td></td>
<td>Special projects</td>
<td>IDF, Atlantic Command,</td>
<td></td>
</tr>
<tr>
<td>readiness inspection</td>
<td></td>
<td>NATO</td>
<td>NATO</td>
<td></td>
</tr>
<tr>
<td>External customers</td>
<td></td>
<td>MILCON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base commands, ROICC</td>
<td>Property Record Files</td>
<td>Change of record card</td>
<td>CINCLANTFLT, NAVFAC</td>
<td></td>
</tr>
<tr>
<td>completion of contract</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External customers</td>
<td>Written justification</td>
<td>Space Utilization/ Demo</td>
<td>CINCLANTFLT, NAVFAC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P&amp;E (AIS Inspector)</td>
<td>Facility report &amp; estimate</td>
<td>AIS Coordination (project documentation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Every command, NAS</td>
<td>Facility &amp; Equipment quantity</td>
<td>BASEREP compilation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Departments</td>
<td>&amp; condition, personnel quantity</td>
<td>(annual)</td>
<td>CINCLANTFLT</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Completed report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Billeting Officer</td>
<td>barracks condition (R21)</td>
<td>BEQ quantity/condition reports (R19, R21)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Body count (R19)</td>
<td>(annual)</td>
<td>Completed report</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LANTDIV (08)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Baseloading (Classified)</td>
<td></td>
<td>LANTDIV (08)</td>
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Figure A.4 - SIPOC Diagram for Planning Division
<table>
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<tr>
<th>Supplier</th>
<th>Input</th>
<th>Process</th>
<th>Output</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMED (Trouble Desk)</td>
<td>Phone call, printed record</td>
<td>Emergency Calls</td>
<td>Repair</td>
<td></td>
</tr>
<tr>
<td>Base residents</td>
<td>Service Calls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material Branch</td>
<td>Construction material</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMED (P&amp;E)</td>
<td>Job Order Package</td>
<td>Minor Projects (&lt;48 hours)</td>
<td>Construction or repair</td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>Designs</td>
<td>Specific Projects (&gt;48 hours)</td>
<td>Base Residents (Every one on base)</td>
<td></td>
</tr>
<tr>
<td>Material Branch</td>
<td>Construction materials</td>
<td>minor construction repair maintenance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSC</td>
<td>Assist contracts</td>
<td>Standing Job Orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FMED</td>
<td>PM Job orders, recurring work</td>
<td>PMI / Recurring work</td>
<td>Maintenance &amp; Repair</td>
<td></td>
</tr>
<tr>
<td>Material Branch</td>
<td>Construction materials</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure A.5 - SIPOC Diagram for Maintenance Division
**Figure A.6 - SIPOC Diagram for Utilities Division**

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Input</th>
<th>Process</th>
<th>Output</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudenes Regional Heating</td>
<td>Hot water to base</td>
<td>Geothermal Heat Distribution</td>
<td>Heating to buildings</td>
<td></td>
</tr>
<tr>
<td>Company</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sudenes Regional Heating</td>
<td>Electricity (50Hz) to base</td>
<td>Electricity Conversion (60Hz) and Distribution</td>
<td>KWH</td>
<td>Base Residents (Everyone on base)</td>
</tr>
<tr>
<td>Company</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Power Plant</td>
<td>Water to base</td>
<td>Water Distribution</td>
<td>Potable Water</td>
<td></td>
</tr>
<tr>
<td>Sudenes Water Works</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Water Plant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

606 - Utilities
Figure A.7 - SIPOC Diagram for Transportation Division
608 - Facility Support Contracts

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Input</th>
<th>Process</th>
<th>Output</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMED Engineering</td>
<td>Contract requirement documents</td>
<td>Facility Contracts Solicitation (sealed bid or negotiate)</td>
<td>Award contract</td>
<td>Base Users</td>
</tr>
<tr>
<td>Contractor</td>
<td>Service or work in place</td>
<td>Contract administration</td>
<td>Quality assurance/inspection</td>
<td>Base User</td>
</tr>
</tbody>
</table>

Figure A.8 - SIPOC Diagram for Contracts Division
Figure A.9 - SIPOC Diagram for Environmental Division
Appendix B1 - Fiscal/Personnel Division Metrics
<table>
<thead>
<tr>
<th>Metric</th>
<th>Work Year Utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured and in what units of measure</td>
<td>Measure of staffing levels at PWD. Work years set by Comptroller</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Resource Utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure</td>
<td>Work Year - One person working for One year at PWD</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Comptroller</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Run Chart, Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Financial Manager</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO/APWO</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Administrative Officer</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Under - indicates staffing below target, ability to hire more employees&lt;br&gt;Over - indicates staffing above target and will result in over commitment at end of fiscal year unless corrective action is taken.</td>
</tr>
<tr>
<td>Metric</td>
<td>End Strength</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Definition of what is being measured</td>
<td>End strength (number of people employed in Public Works at the end of the month/year)</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Cost Management and Resource Utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Authorized: Level set by Comptroller</td>
</tr>
<tr>
<td></td>
<td>Used: Current staffing level</td>
</tr>
<tr>
<td></td>
<td>Units - Number of employees</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Comptroller, In-house records</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Run Chart</td>
</tr>
<tr>
<td></td>
<td>Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Financial Manager</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO/APWO/Shops Engineer/ all divisions in PW</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>PWO/APWO/ Administrative Officer</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Trends clearly show the authorized end strength and amount used to date. Multiple years indicate downsizing over the past years.</td>
</tr>
<tr>
<td>Metric</td>
<td>Overtime Utilization</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Definition of what is being measured</td>
<td>Overtime usage at PWD broken into labor categories</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Cost Management and Resource Utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>P1-D9 - Budget categories</td>
</tr>
<tr>
<td></td>
<td>Authorized - hours authorized by comptroller</td>
</tr>
<tr>
<td></td>
<td>Used - actual hours used to date</td>
</tr>
<tr>
<td></td>
<td>Norm - target % to date</td>
</tr>
<tr>
<td></td>
<td>Units - hours</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Comptroller</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Histogram with line indicating upper limits</td>
</tr>
<tr>
<td></td>
<td>Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Financial Manager</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO/APWO/Shops Engineer/ all divisions in PW</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Division directors</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Individual labor categories are broken out. The norm% indicates the target amount for the year to date.</td>
</tr>
</tbody>
</table>
Overtime Utilization FY97

<table>
<thead>
<tr>
<th>Hours</th>
<th>P1</th>
<th>P2</th>
<th>P4</th>
<th>P5</th>
<th>P9</th>
<th>D8 Total</th>
<th>P7</th>
<th>P8</th>
<th>S6</th>
<th>D9 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorized</td>
<td>2536</td>
<td>1700</td>
<td>1677</td>
<td>4</td>
<td>224</td>
<td>6141</td>
<td>2768</td>
<td>231</td>
<td>162</td>
<td>3161</td>
</tr>
<tr>
<td>Used</td>
<td>1931</td>
<td>660</td>
<td>676</td>
<td>0</td>
<td>68</td>
<td>3335</td>
<td>2145</td>
<td>180</td>
<td>20</td>
<td>2345</td>
</tr>
<tr>
<td>% Used</td>
<td>76%</td>
<td>39%</td>
<td>40%</td>
<td>0%</td>
<td>30%</td>
<td>54%</td>
<td>77%</td>
<td>78%</td>
<td>12%</td>
<td>74%</td>
</tr>
</tbody>
</table>

Norm: 64%

Figure B1.3 - Example of Overtime Utilization
<table>
<thead>
<tr>
<th>Metric</th>
<th>Toll Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Long distance telephone call use</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Cost Management</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Ceiling - $&amp;$ authorized</td>
</tr>
<tr>
<td></td>
<td>Used - actual $&amp;$ used to date</td>
</tr>
<tr>
<td></td>
<td>Authorization - Total $&amp;$ authorized for PW</td>
</tr>
<tr>
<td></td>
<td>Actual cost FYTD - $&amp;$ used to date</td>
</tr>
<tr>
<td></td>
<td>Norm - scheduled target</td>
</tr>
<tr>
<td></td>
<td>Used - % used to date</td>
</tr>
<tr>
<td></td>
<td>Units - $&amp;$</td>
</tr>
<tr>
<td>Sources of data</td>
<td>NCTS Telephone branch</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Histogram with line indicating upper limits</td>
</tr>
<tr>
<td></td>
<td>Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Financial Manager</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO/APWO/Shops Engineer/ all divisions in PW</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>All division directors</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Tracking of PWD long distance calls by division. Percentage on top of graph shows each division’s percentage of total PWD costs. Norm % indicates the target amount for year to date</td>
</tr>
</tbody>
</table>
% of PWD Total Cost FYTD

Toll Costs FY-97

<table>
<thead>
<tr>
<th>60</th>
<th>60D</th>
<th>60E</th>
<th>601</th>
<th>602</th>
<th>603</th>
<th>604</th>
<th>605</th>
<th>606</th>
<th>607</th>
<th>608</th>
<th>F/P</th>
<th>FSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling</td>
<td>150</td>
<td>200</td>
<td>2200</td>
<td>1100</td>
<td>1900</td>
<td>1300</td>
<td>450</td>
<td>400</td>
<td>150</td>
<td>1700</td>
<td>2500</td>
<td>1200</td>
</tr>
<tr>
<td>Used</td>
<td>83</td>
<td>110</td>
<td>1129</td>
<td>560</td>
<td>968</td>
<td>641</td>
<td>226</td>
<td>198</td>
<td>81</td>
<td>865</td>
<td>1274</td>
<td>593</td>
</tr>
<tr>
<td>% Used</td>
<td>55%</td>
<td>55%</td>
<td>51%</td>
<td>51%</td>
<td>49%</td>
<td>50%</td>
<td>50%</td>
<td>54%</td>
<td>51%</td>
<td>49%</td>
<td>54%</td>
<td></td>
</tr>
</tbody>
</table>

Authorization: $14,200
Actual Cost FYTD: $7,242
Norm: 50%
Used: 51%

Figure B1.4 - Example of Long Distance Usage
<table>
<thead>
<tr>
<th>Metric</th>
<th>OPTAR P1 Tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Tracking of OPTAR P1 for PWD</td>
</tr>
<tr>
<td>Justification for the measurement. Key</td>
<td>Cost Management</td>
</tr>
<tr>
<td>result areas supported</td>
<td></td>
</tr>
<tr>
<td>Description. Definition of all terms</td>
<td>OPTAR - Operation Target</td>
</tr>
<tr>
<td>involved in the measure and units</td>
<td>P1 - PW budget for other engineering support</td>
</tr>
<tr>
<td></td>
<td>Authorization - Amount set by Comptroller</td>
</tr>
<tr>
<td></td>
<td>Committed - $ spent by PW</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Comptroller</td>
</tr>
<tr>
<td>Data presentation method. Chart type,</td>
<td>Run Chart</td>
</tr>
<tr>
<td>software used</td>
<td>Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly update</td>
</tr>
<tr>
<td>Responsibility for data collection,</td>
<td>Financial Manager</td>
</tr>
<tr>
<td>plotting analysis</td>
<td></td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO/APWO/Shops Engineer/ all divisions in PW</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary</td>
<td>PWO/APWO/ Administrative Officer</td>
</tr>
<tr>
<td>control action</td>
<td></td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Authorized money doesn’t arrive in a linear fashion. The</td>
</tr>
<tr>
<td></td>
<td>authorization line shows the trend of money being</td>
</tr>
<tr>
<td></td>
<td>delayed until the third and fourth quarter. Tracking the</td>
</tr>
<tr>
<td></td>
<td>committed funds shows the over or under obligation</td>
</tr>
</tbody>
</table>
Figure B1.5 - Example of OPTAR Tracking for P1 Budget
Appendix B2 - Facilities Management Engineering Metrics
<table>
<thead>
<tr>
<th>Metric</th>
<th>Long Range Maintenance Plan Investment Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Number of hours devoted to Navy’s investment categories</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Cost Management and Resource Utilization</td>
</tr>
</tbody>
</table>
| Description. Definition of all terms involved in the measure and units | IC - Investment category code
Hours - number of hours dedicated to maintenance and repair
Units - Work hours                                                      |
| Sources of data                                                        | Comptroller, In-house records                                                        |
| Data presentation method. Chart type, software used                    | Histogram grouped by IC
Excel                                                                       |
| Update cycle                                                           | Annual update                                                                         |
| Responsibility for data collection, plotting analysis                  | 602A                                                                                  |
| Distribution of updated charts                                         | PWO/APWO/Shops Engineer/ all divisions in PW PW Customers                             |
| Highest level of review                                                | PWO                                                                                   |
| Who is responsible for taking necessary control action                 | PWO/APWO/Facilities Management Engineering Director                                   |
| Comments and summary:                                                 |                                                                                       |
Long Range Plan
Divided by Investment Category  May 1997-Apr 1998

Figure B2.1 - Long Range Plan categorized by Investment Categories
<table>
<thead>
<tr>
<th>Metric</th>
<th>Long Range Maintenance Plan Base customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Number of hours devoted to Base customers</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Cost Management and Resource Utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Customers - Commands and NAS departments which receive services from PW Hours - number of hours dedicated to maintenance and repair Units - Work hours</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Comptroller, In-house records</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Histogram grouped by customer Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Annual update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>602A</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO/APWO/Shops Engineer/ all divisions in PW PW Customers</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>PWO/APWO/ Facilities Management Engineering Director</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td></td>
</tr>
</tbody>
</table>

52
Long Range Plan By Customer Codes

Figure B2.2 - Long Range Plan categorized by Customer Codes
Table B2.3 - Causes of Delay (Variance)

<table>
<thead>
<tr>
<th>Metric</th>
<th>Causes of Delay (Variance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Summary of Delays from Shop Load plan work schedule.</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Cost Management and Resource Utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Causes of Delay&lt;br&gt;  W - weather&lt;br&gt;  L - labor availability (lack of)&lt;br&gt;  M - material&lt;br&gt;  U - unforeseen conditions&lt;br&gt;  S - customer change in scope&lt;br&gt;  C - customer caused delay&lt;br&gt;  O - other</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Shop Load plan and Production Controller</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Histogram&lt;br&gt; Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly (discuss at variance meeting)</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Production Controller, 602A</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO/APWO/Shops Engineer/ Facilities Management Engineering Director/ Maintenance Division Director</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Shops Engineer, Facilities Management Engineering Director, Maintenance Division Director</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>hypothetical data - actual not available</td>
</tr>
</tbody>
</table>
Causes of Delays

Hypothetical Data - Chart does not reflect real conditions

Figure B2.3 - Example of Causes of Delay Analysis
Appendix B3 - Engineering Metrics
<table>
<thead>
<tr>
<th><strong>Metric</strong></th>
<th><strong>Engineering Design</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>PW Engineering design efficiency</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Resource Utilization</td>
</tr>
<tr>
<td><strong>Description. Definition of all terms involved in the measure and units</strong></td>
<td>Design $S$ - estimated construction costs to construct the project. Hours and costs for the design effort are accounted separately. Design and Tech hours - work hours by engineers and technicians on projects. Units - $(S$ Cost Estimated$) / (Design + Tech hours)$</td>
</tr>
<tr>
<td>Sources of data</td>
<td>In-house records</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Run Chart (Control Chart later), Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Quarterly update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Engineering Division Director</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO / APWO / Engineering Division Director</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO / APWO / Engineering Division Director</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Engineering Division Director</td>
</tr>
<tr>
<td><strong>Comments and summary:</strong></td>
<td>Units show Ratio of Cost Estimated $S$ to design hours. Higher numbers reflect better efficiency (i.e., more design for less work hours). If this ratio is ambiguous, develop another, but make sure the figures include efficiency and not simply workload measurements. Hypothetical data - actual not available</td>
</tr>
</tbody>
</table>
Engineering Design Efficiency

Hypothetical Data - Chart does not reflect real conditions

Figure B3.1 - Example of Engineering Design Efficiency
Appendix B4 - Planning Metrics
<table>
<thead>
<tr>
<th>Metric</th>
<th>Special Project Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Completion of special project documentation</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Cost Management and Resource Utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Number of projects - Special project packages completed during Fiscal year</td>
</tr>
<tr>
<td></td>
<td>Hours - total hours spent on projects</td>
</tr>
<tr>
<td></td>
<td>Units - each package</td>
</tr>
<tr>
<td>Sources of data</td>
<td>In-house records</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Control Chart</td>
</tr>
<tr>
<td></td>
<td>Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Annual update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Planning Division Director</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO / APWO / Facilities Management Engineering Director / Engineering Division Director / CINCLANTFLT</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Planning Division Director</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Current trend measures output from division. (Workload measurement) Recommend changing to</td>
</tr>
<tr>
<td></td>
<td>efficiency measurement by calculating:</td>
</tr>
<tr>
<td></td>
<td># estimates/total hours worked on estimates.</td>
</tr>
<tr>
<td></td>
<td>hypothetical data - actual not available</td>
</tr>
</tbody>
</table>
Special Project Documentation Efficiency

Hypothetical Data - Chart does not reflect real conditions

Figure B4.1 - Example of Special Project Documentation Efficiency
<table>
<thead>
<tr>
<th>Metric</th>
<th>Space Utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Tracking of relocation and space requests by base commands and departments</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Resource Utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td></td>
</tr>
<tr>
<td>Sources of data</td>
<td>Existing database</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Currently no method</td>
</tr>
<tr>
<td>Update cycle</td>
<td>As-necessary (at least quarterly)</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Planning Division Director</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>NAS Executive Officer, PWO, APWO, Planning Division Director</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>NAS Executive Officer</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>NAS Executive Officer, PWO, Planning Division Director</td>
</tr>
<tr>
<td>Comments and summary: Space utilization report is generated after each utilization meeting. Listed are requests granted, put on hold, and rejected. Compile the actions into groups by command.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B5 - Maintenance Metrics
<table>
<thead>
<tr>
<th>Metric</th>
<th>Shop Loading Predictability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Predictability of Shop Load Plan actually worked based on the level of loading</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Cost Management and Resource Utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Shop loading % - percentage of total estimated available work hours for the month % Worked - percentage of shop loaded hours worked for the month</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Shop Load Plan, labor distribution cards</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Scatter diagram Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Maintenance Division Director, Production Controller</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO / APWO / Shops Engineer / Facilities Management Engineering Director</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Shops Engineer, Maintenance Division Director, Facilities Management Engineering Director</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Scatter plot indicates that the more the plan is loaded to maximum, the less like the chance of having it worked to the maximum is. Continue to collect data to determine stronger correlation.</td>
</tr>
</tbody>
</table>
Figure B5.1 - Example of Scatter Plot for Shop Load Plan Predictability
<table>
<thead>
<tr>
<th>Metric</th>
<th>Priority Job Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Delays in original shop load plan due to unforeseen priority jobs.</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Cost Management and Resource Utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Priority Jobs - Commanding Officer interest jobs, Other requests from Higher HQ, Storm damage or other jobs requiring immediate attention Units - Work hours</td>
</tr>
<tr>
<td>Sources of data</td>
<td>605A labor distribution and time cards</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Control Chart Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Maintenance Division Director, Production Controller</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO / APWO / Shops Engineer / Facilities Management Engineering Director</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>PWO, Shops Engineer, Maintenance Division Director</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Average hours spent on priority jobs must be figured into the shop load plan estimate. Ignoring this amount of hours will only lead to failure in meeting the shop load plan</td>
</tr>
</tbody>
</table>
Priority Job Impact on Shop Load Plan

Average 250 hours/month working on Priority Jobs.

Figure B5.2 - Example of Impact of Priority Jobs on Shop Load Plan
<table>
<thead>
<tr>
<th>Metric</th>
<th>Effect of Leave Planning on Shop Load Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Planned leave hours v. actual leave hour</td>
</tr>
<tr>
<td>Justification for the measurement: Key result areas supported</td>
<td>Resource Utilization</td>
</tr>
<tr>
<td>Description: Definition of all terms involved in the measure and units</td>
<td>Work hours - includes annual, emergency and sick leave. Planned - estimated leave hours. Actual - actual leave hours used</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Time cards, labor distribution cards</td>
</tr>
<tr>
<td>Data presentation method: Chart type, software used</td>
<td>Run Chart, Control Chart, Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Production Controller</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO/APWO/Shops Engineer/ Facilities Management Engineering Director</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>Shops Engineer</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Shops Engineer, Maintenance Division Director</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Ratio doesn’t indicate actual +/- hours. Ratio greater than 1 indicates less leave taken than planned, less than 1 indicates more leave taken than planned. More leave taken than planned means less hours available for the shop load plan.</td>
</tr>
</tbody>
</table>

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Effect of Leave Planning on Shop Load Plan

Favorable

Unfavorable

Index = planned leave / actual leave
Favorable = Less leave taken than planned
Unfavorable = More leave taken than planned

Figure B5.3 - Example of Leave Predictability
<table>
<thead>
<tr>
<th>Metric</th>
<th>In-House Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Efficiency of in-house shop forces on maintenance projects</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Resource Utilization</td>
</tr>
</tbody>
</table>
| Description. Definition of all terms involved in the measure and units | Efficiency: \[
\left(1 - \frac{\text{actual hours} - \text{est. hours}}{\text{est. hours}}\right) \times 100
\] |
| Sources of data | Labor cards and shop load plan |
| Data presentation method. Chart type, software used | Control Chart Excel |
| Update cycle | Monthly |
| Responsibility for data collection, plotting analysis | Maintenance Division Director, Production Controller |
| Distribution of updated charts | PWO/APWO/Shops Engineer/ Facilities Management Engineering Director |
| Highest level of review | PWO |
| Who is responsible for taking necessary control action | Shops Engineer, Maintenance Division Director |
| Comments and summary: | Weakness arises when original estimate is inaccurate. Review amendment process. Too many times the estimator just increases the authorized hours to reflect the actual hours spent on the job. |
In-House Shop Forces Efficiency

Figure B5.4 - Example of In-House Shop Forces Efficiency
<table>
<thead>
<tr>
<th>Metric</th>
<th>Work Delays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Identifying causes of delay for shop forces</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Cost Management and Resource Utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Work hours - time spent on the job</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Shop Work forces, foremen complete survey</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Histogram, Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Maintenance Division Director, Production Controller, Facilities Maintenance Supervisor (General Foreman)</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO / APWO / Shops Engineer / Facilities Management Engineering Director / Engineering Division Director</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Shops Engineer, Maintenance Division Director</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Foremen complete survey over a pre-determined time period (1 day/week) or (1 week/month)</td>
</tr>
</tbody>
</table>
FOREMAN DELAY SURVEY

Date: ___________________  Craft: ___________________  Foreman’s Name: ___________________

Number in shop: ___________________

<table>
<thead>
<tr>
<th>Delay Causes</th>
<th>Number of Hours Delayed</th>
<th>Number of Workers</th>
<th>Work hours Delayed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Waiting for materials (warehouse)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Waiting for materials (off site)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Waiting for tools</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Waiting for equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Re-work (design changes or errors)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Re-work (prefabrication errors)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Re-work (field errors)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Moving to other areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Waiting for information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Waiting for work or flame permits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Waiting on contractor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Interference with other contractors / crews</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Other (Specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Comments</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure B5.5 - Foreman Delay Data Collection Sheet
<table>
<thead>
<tr>
<th>Metric</th>
<th>Service Call Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Average completion time of service calls</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Resource utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Completion Time - average time for service call completion.</td>
</tr>
<tr>
<td></td>
<td>Units - days</td>
</tr>
<tr>
<td>Sources of data</td>
<td>PWD Database (ECMS??)</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Run Chart, Control Chart (later)</td>
</tr>
<tr>
<td></td>
<td>Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly Update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Production Controller</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>Shops Engineer, Maintenance Division Director, E&amp;S Shops</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>Shops Engineer</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Shops Engineer, Maintenance Division Director</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Tracking of service call completion time provides information to the customer as to when they can reasonably expect their call to be completed</td>
</tr>
</tbody>
</table>
Hypothetical Data - Chart does not reflect real conditions
<table>
<thead>
<tr>
<th>Metric</th>
<th>Service Call Backlog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Measure of Backlog the PWD Service calls.</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Resource utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Backlog indicates outstanding service calls that are scheduled for completion by the Emergency Services Section of PWD</td>
</tr>
<tr>
<td>Sources of data</td>
<td>PWD Database (ESMS?)</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Histogram (grouped into trades)</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Weekly</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Production Controller</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>Shops Engineer, shops</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>Shops Engineer</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Shops Engineer, Maintenance Division Director</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Breakdown by trades will alert foreman to possibility of process going out of control Service calls out of scope requiring planning and estimating are removed from E/S and transferred to maintenance backlog.</td>
</tr>
<tr>
<td></td>
<td>hypothetical data - actual not available</td>
</tr>
</tbody>
</table>
Backlog of Service Calls for E&S Section

Hypothetical Data - Chart does not reflect real conditions

Figure B5.7 - Example of Backlog for Routine Service Calls
<table>
<thead>
<tr>
<th>Metric</th>
<th>Jobs using MS Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Measurement of PWD Jobs using MS Project to track and schedule</td>
</tr>
<tr>
<td>Justification for the measurement. Key</td>
<td>Resource utilization</td>
</tr>
<tr>
<td>result areas supported</td>
<td></td>
</tr>
<tr>
<td>Description. Definition of all terms in the</td>
<td>Units - Number of jobs using MS Project to track and schedule work during the current</td>
</tr>
<tr>
<td>measure and units</td>
<td>month</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Shops</td>
</tr>
<tr>
<td>Data presentation method. Chart type,</td>
<td>Run Chart</td>
</tr>
<tr>
<td>software used</td>
<td></td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly</td>
</tr>
<tr>
<td>Responsibility for data collection,</td>
<td>Production Controller</td>
</tr>
<tr>
<td>plotting analysis</td>
<td></td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>Shops Engineer, Maintenance Division Director</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>Shops Engineer</td>
</tr>
<tr>
<td>Who is responsible for taking necessary</td>
<td>Shops Engineer, Maintenance Division Director</td>
</tr>
<tr>
<td>control action</td>
<td></td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Tracking of actual jobs using MS Project should show trend over time of increased use of scheduling techniques.</td>
</tr>
<tr>
<td></td>
<td>Hypothetical data - actual not available</td>
</tr>
</tbody>
</table>
History of Scheduling Improvement

Hypothetical Data - Chart does not reflect real conditions

Figure B5.8 - Tracking of Jobs using MS Project for Scheduling
Appendix B6 - Utilities Metrics
<table>
<thead>
<tr>
<th>Metric</th>
<th>Electricity Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Average Daily use of electricity on base</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Cost management &amp; Resource utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Daily KWH Used - Average of monthly usage to show a better representation due to unequal days of the month.</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Base power plant and billings from suppliers</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Run Chart, Control Chart, Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly Update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Utilities Division Director</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>Shops Engineer, Utilities Division Director, White Falcon</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>Utilities Division Director</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Utilities Division Director</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Tracking and reporting to the base users through base wide media (White Falcon, Newsline) on a monthly basis will provide feedback as to how the base is doing in conserving electricity. Informative, brief articles accompanying the graphs as to how the residents can help conserve energy will provide additional impact.</td>
</tr>
</tbody>
</table>
Electricity Use at NAS Keflavik

Figure B6.1 - Example of Electricity Use

Daily KWH used
<table>
<thead>
<tr>
<th>Metric</th>
<th>Water Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Amount of water used by base</td>
</tr>
<tr>
<td>Justification for the measurement. Key result</td>
<td>Resource utilization</td>
</tr>
<tr>
<td>areas supported</td>
<td></td>
</tr>
<tr>
<td>Description. Definition of all terms involved</td>
<td>Units - millions of gallons</td>
</tr>
<tr>
<td>in the measure and units</td>
<td></td>
</tr>
<tr>
<td>Sources of data</td>
<td>Base Water Plant - readings taken on a daily basis</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software</td>
<td>Run Chart, Control Chart (later)</td>
</tr>
<tr>
<td>used</td>
<td>Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly Update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting</td>
<td>Utilities Division Director, Water Plant Supervisor</td>
</tr>
<tr>
<td>analysis</td>
<td></td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>Shops Engineer, Utilities Division Director, White Falcon, PWO, APWO</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>Utilities Division Director</td>
</tr>
<tr>
<td>Who is responsible for taking necessary</td>
<td>Utilities Division Director</td>
</tr>
<tr>
<td>control action</td>
<td></td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Under the current water contract, the base receives the water free of</td>
</tr>
<tr>
<td></td>
<td>charge. This will change under the new contract. Tracking and reporting</td>
</tr>
<tr>
<td></td>
<td>to the base users through base wide media (White Falcon, Newsline) on a</td>
</tr>
<tr>
<td></td>
<td>monthly basis will provide feedback as to how the base is doing in</td>
</tr>
<tr>
<td></td>
<td>conserving water.</td>
</tr>
<tr>
<td>Metric</td>
<td>Geothermal Heating</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>Definition of what is being measured</td>
<td>Heating water flow into the base</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Resource utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Liters/minute - total liters per minute flowing into the base</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Bills from suppliers (Sudenes Regional Heating Authority)</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Run Chart</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly Update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Utilities Division Director, Management and Budget Technician</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO, APWO, Shops Engineer, Utilities Division Director</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Utilities Division Director</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>This measurement is mainly for reviewing past information. Flows are controlled by PW and the geothermal contract.</td>
</tr>
</tbody>
</table>
Appendix B7 - Transportation Metrics
<table>
<thead>
<tr>
<th>Metric</th>
<th>Vehicle Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Average Monthly Percentage of Class ‘C’ vehicle availability</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Customers, Resource Utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Availability - vehicle is in operating condition</td>
</tr>
<tr>
<td>Sources of data</td>
<td>PC Transport Database</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Run Chart, control chart (later) Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly Update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Transportation Officer</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO, APWO, Transportation Officer</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Transportation Officer</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Develop criteria for availability that is meaningful for both PW and customers</td>
</tr>
<tr>
<td></td>
<td>hypothetical data - actual not available</td>
</tr>
</tbody>
</table>
Vehicle Availability

Hypothetical Data - Chart does not reflect real conditions

Figure B7.1 - Example of Class 'C' Vehicle Availability
<table>
<thead>
<tr>
<th>Metric</th>
<th>Vehicle Turn-Around Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Average time for completion of repairs to vehicles</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Customers, Resource Utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Repair Time - Number of days from time vehicle is delivered to PW until time it is returned to the customer</td>
</tr>
<tr>
<td>Sources of data</td>
<td>PC Transport Database</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Run Chart, control chart (later) Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly Update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Transportation Officer</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO, APWO, Transportation Officer</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Transportation Officer</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>hypothetical data - actual not available</td>
</tr>
</tbody>
</table>
Vehicle Turn-Around Time

Hypothetical Data - Chart does not reflect real conditions

Figure B7.2 - Example of Vehicle Turn-Around Time
Appendix B8 - Contracts Metrics
Table B8.1 – Invoice Turn-Around Time

<table>
<thead>
<tr>
<th>Metric</th>
<th>Invoice Turn-Around Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Average time for Contracts Division to process contractor’s invoice</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Cost management</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Invoice Time - Number of days from time Contracts receives invoice until time processing is complete</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Procurement records</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Run Chart, control chart (later) Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly Update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Procurement Clerks, Contract Specialists</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO, APWO, Contracts Division Director</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Contracts Division Director</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>hypothetical data - actual not available</td>
</tr>
</tbody>
</table>
Processing of Contractor Invoices

Figure B8.1 - Control Chart Tracking Processing Times for Contractor's Invoices

Hypothetical Data - Chart does not reflect real conditions
<table>
<thead>
<tr>
<th>Metric</th>
<th>Contractor Performance Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Annual performance of Service Contractors</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Customer</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td></td>
</tr>
<tr>
<td>Sources of data</td>
<td>Contract files</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Histogram, Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Annual Update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>Contract Specialist, FSCM</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO, APWO, Contracts Division Director</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Contracts Division Director</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td></td>
</tr>
<tr>
<td>Metric</td>
<td>Customer Satisfaction</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Definition of what is being measured</td>
<td>Satisfaction of Base Customers on the services they receive from the contractors</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Customers</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td></td>
</tr>
<tr>
<td>Sources of data</td>
<td>Inspection Surveys</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Histogram, Paraedo Chart, Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly Update</td>
</tr>
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<td>FSCM</td>
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<td>PWO, APWO, Contracts Division Director</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>FSCM</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Develop a short series of questions to ask random customers about the service they receive from contracted work. Compile the information into a meaningful presentation.</td>
</tr>
<tr>
<td>Metric</td>
<td>Procurement Action Lead Time</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Definition of what is being measured</td>
<td>Comparison of Actual Procurement Actions with scheduled actions</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Customers, Resource Utilization</td>
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<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Scheduled Time - Estimated Time of action&lt;br&gt;Actual Time - Actual completion date</td>
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<tr>
<td>Sources of data</td>
<td>Contract Database</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly Update</td>
</tr>
<tr>
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<td>Contracting Officer, Contract Specialist, Procurement Clerk</td>
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<tr>
<td>Distribution of updated charts</td>
<td>PWO, APWO, Contracts Division Director</td>
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<td>Highest level of review</td>
<td>OIC</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Contracting Officer</td>
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<tr>
<td>Comments and summary:</td>
<td></td>
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Appendix B9 - Environmental Metrics
<table>
<thead>
<tr>
<th>Metric</th>
<th>Hazardous Waste Pick-Up</th>
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</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Response time to pick up hazardous waste</td>
</tr>
<tr>
<td>Justification for the measurement. Key</td>
<td>Safety, Customer</td>
</tr>
<tr>
<td>result areas supported</td>
<td></td>
</tr>
<tr>
<td>Description. Definition of all terms</td>
<td>Response Time - Length of time from receiving initial request to time waste is picked up</td>
</tr>
<tr>
<td>involved in the measure and units</td>
<td></td>
</tr>
<tr>
<td>Sources of data</td>
<td>Environmental Records</td>
</tr>
<tr>
<td>Data presentation method. Chart type,</td>
<td>Run Chart, control chart (later)</td>
</tr>
<tr>
<td>software used</td>
<td>Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly Update</td>
</tr>
<tr>
<td>Responsibility for data collection,</td>
<td>60E11 Hazardous Waste Services</td>
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<tr>
<td>plotting analysis</td>
<td></td>
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<tr>
<td>Distribution of updated charts</td>
<td>PWO, APWO, Environmental Officer</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary</td>
<td>Environmental Officer</td>
</tr>
<tr>
<td>control action</td>
<td></td>
</tr>
<tr>
<td>Comments and summary:</td>
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</tbody>
</table>
Hazardous Waste Pick Up

Hypothetical Data - Chart does not reflect real conditions

Figure B9.1 - Example of Hazardous Waste Pick Up Response Time
<table>
<thead>
<tr>
<th>Metric</th>
<th>Spill Response Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Response time for hazardous waste spills</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Safety, Customers</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Response Time - Length of time from receiving initial notification to time on site.</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Environmental Records</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Run Chart, control chart (later) Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly Update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>60E11 Environmental Support Services</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO, APWO, Environmental Officer</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Environmental Officer</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>Hypothetical data - actual not available</td>
</tr>
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</table>
Spill Response Time

Hypothetical Data - Chart does not reflect real conditions

Figure B9.2 - Example of Spill Response Time
<table>
<thead>
<tr>
<th>Metric</th>
<th>Construction Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Number of construction reviews performed by Environmental Division and average time for review</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Safety, Resource Utilization</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td>Review Time - Length of time from receiving initial request to time construction review is completed</td>
</tr>
<tr>
<td>Sources of data</td>
<td>Internal record tracking</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Run Chart, control chart (later) Excel</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly Update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>60E2 and 60E3, Environmental Engineers</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO, APWO, Environmental Officer</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Environmental Officer</td>
</tr>
<tr>
<td>Comments and summary</td>
<td>Hypothetical data - actual not available</td>
</tr>
</tbody>
</table>
Environmental Construction Review

Hypothetical Data - Chart does not reflect real conditions

Figure B9.3 - Example of Construction Review Measurements
<table>
<thead>
<tr>
<th>Metric</th>
<th>Water Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of what is being measured</td>
<td>Consistency of Water Quality at NAS Keflavik</td>
</tr>
<tr>
<td>Justification for the measurement. Key result areas supported</td>
<td>Safety</td>
</tr>
<tr>
<td>Description. Definition of all terms involved in the measure and units</td>
<td></td>
</tr>
<tr>
<td>Sources of data</td>
<td>Environmental Records</td>
</tr>
<tr>
<td>Data presentation method. Chart type, software used</td>
<td>Histogram&lt;br&gt;Excel&lt;br&gt;(Run/Control chart if data is quantifiable)</td>
</tr>
<tr>
<td>Update cycle</td>
<td>Monthly Update</td>
</tr>
<tr>
<td>Responsibility for data collection, plotting analysis</td>
<td>60E3, Environmental Engineer (Water Resources Program Director)</td>
</tr>
<tr>
<td>Distribution of updated charts</td>
<td>PWO, APWO, Environmental Officer</td>
</tr>
<tr>
<td>Highest level of review</td>
<td>PWO</td>
</tr>
<tr>
<td>Who is responsible for taking necessary control action</td>
<td>Environmental Officer</td>
</tr>
<tr>
<td>Comments and summary:</td>
<td>No chart developed yet -- determine the best type based on data collection</td>
</tr>
</tbody>
</table>
# Appendix C - List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>AIS</td>
<td>Annual Inspection Summary</td>
</tr>
<tr>
<td>APWO</td>
<td>Assistant Public Works Officer</td>
</tr>
<tr>
<td>CINCLANTFLT</td>
<td>Commander-In-Chief, Atlantic Fleet</td>
</tr>
<tr>
<td>DON</td>
<td>Department of Navy</td>
</tr>
<tr>
<td>FMED</td>
<td>Facilities Management Engineering Division</td>
</tr>
<tr>
<td>FSC</td>
<td>Facilities Support Contracts</td>
</tr>
<tr>
<td>FSCM</td>
<td>Facilities Support Contract Manager</td>
</tr>
<tr>
<td>HRO</td>
<td>Human Resources Office</td>
</tr>
<tr>
<td>LANTDIV</td>
<td>Atlantic Division of NAVFAC</td>
</tr>
<tr>
<td>NAS</td>
<td>Naval Air Station</td>
</tr>
<tr>
<td>NAVFAC</td>
<td>Naval Facilities Engineering Command</td>
</tr>
<tr>
<td>OPTAR</td>
<td>Operation Target (Budget Goal)</td>
</tr>
<tr>
<td>P&amp;E</td>
<td>Planning &amp; Estimating</td>
</tr>
<tr>
<td>PWD</td>
<td>Public Works Department</td>
</tr>
<tr>
<td>PWO</td>
<td>Public Works Officer</td>
</tr>
<tr>
<td>SIPOC</td>
<td>Supply-Input-Process-Output-Customer</td>
</tr>
<tr>
<td>SJO</td>
<td>Standing Job Order</td>
</tr>
<tr>
<td>TQL</td>
<td>Total Quality Leadership</td>
</tr>
<tr>
<td>TQM</td>
<td>Total Quality Management</td>
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</table>

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Bibliography


Brassard, Michael & Ritter, Diane (1994). The Memory Jogger II. Goal/QPC, Methuen, MA.


Tucker, Richard L. (Spring 1997). Class Notes from CVEN 395Q, Metrics. University of Texas, Austin